SOILS EXPLORATION

FOR THE

DIAMOND STAR PLANT

WILMINGTON, ILLINOIS

PREPARED FOR

C.P. INORGANICS

10 INDUSTRY AVENUE

JOLIET, ILLINOIS 60435

Professional Service Industries, Inc.
A & H Engineering Division

Professional Service Industries, Inc.
A & H/Flood Engineering Division

June 23, 1987

C.P. Inorganics
10 Industry Avenue
Joliet, Illinois 60435

Attention: Mr. Ed Arnet
Controller

Re: Diamond Star Plant
Wilmington, Illinois
PSI File Number: 043-75020

Gentlemen:

In compliance with your instructions, we have conducted a soils exploration and evaluation in accordance with EPA standards.

The results of this investigation are to be found in the accompanying report, three copies of which are being transmitted herewith.

Very truly yours,

A&H/FLOOD ENGINEERING DIVISION

John J. La Berg

John J. La Berg
E.I.T. 061-020027
Branch Manager

Thomas S. LeDonne, P.E.
Illinois 34585
Vice President

JJL/TSL:sjp

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A&H/FLOOD ENGINEERING DIVISION

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SUBSURFACE EXPLORATION

AND

FOUNDATION RECOMMENDATIONS

INTRODUCTION

This report presents the results of a soils exploration and chemical analysis for Diamond Star Plant, conducted for C.P. Inorganics.

Authorization

Authorization to perform this exploration and analysis was in the form of a signed proposal, dated May 20, 1987, Number 043-048, from C.P. Inorganics to Professional Service Industries, Inc.

Purpose

The purpose of this subsurface exploration and analysis was to determine the chemical constituents of a composite soil sample and to provide general information on the subsurface soils.

Scope

The scope of the exploration and analysis included the subsurface exploration, laboratory testing, and a chemical analysis and evaluation of the subsurface materials.

This report has been prepared for the exclusive use of C.P. Inorganics for the specific application to the Diamond Star Plant in accordance with generally accepted soils and foundation engineering practices.

DESCRIPTION OF SITE

Site Location

The site of the existing plant upon which this soils exploration has been made, lies on the south side of Peotone Road, approximately five-hundred (500) feet west of the Personal Products Plant, in Wilmington, Illinois.

Site Topography, Drainage and Vegetation

This site is hilly, there being some estimated ten (10) feet difference in elevation between the west and east ends of the property.

The surface is covered by brush and is lightly wooded.

At the time of the site exploration, surface drainage appeared to be good with runoff into a river adjacent to the site, and the surface of the site was firm and the drilling equipment experienced no difficulty in moving around the site.

FIELD EXPLORATION

Scope

The field exploration to determine the general characteristics of the subsurface materials included a reconnaissance of the project site, making the borings, performing standard penetration tests, and recovering disturbed split-spoon samples.

The apparent groundwater level was recorded in each boring after completion.

One (1) soil test boring and four (4) auger probes have been made, and these were drilled to depths of fifteen (15) feet below the existing ground surface. They were drilled in the locations determined by PSI and are indicated on the boring location plan provided in the Appendix.

Drilling and Sampling Procedures

The soil borings were performed with a drilling rig equipped with a rotary head. Conventional hollow-stem augers were used to advance one hole. Representative samples were obtained employing split-spoon sampling procedures in accordance with ASTM designation D-1586.

The four other soil borings were made using continuous flight auger. Representative samples were obtained from the augered soil.

Field Tests and Measurements

Penetration Tests - During the sampling procedure on boring number 4, standard penetration tests were performed at regular intervals to obtain the standard penetration value of the soil. The standard penetration value (N) is defined as the number of blows of a 140 pound hammer, falling thirty (30) inches, required to advance the split-spoon sampler one (1) foot into the soil. The sampler is lowered to the bottom of the drill hole and the number of blows recorded for each of three (3) successive increments of six (6) inches penetration. The "N" value is obtained by adding the second and third incremental numbers. The results of the standard penetration test indicate the relative density and comparative consistency of the soils, and thereby provide a basis for estimating the relative strength and compressibility of the soil profile components.

Strength Tests - During the field boring operations on boring number 4, samples of the cohesive soil from the split-spoon sampling device were frequently tested in unconfined compression by use of a calibrated soil

penetrometer. The values of the unconfined compressive strength, as determined on samples of soil from the split-spoon sampling, must be considered recognizing the manner in which they were obtained because the split-spoon sampling techniques provide a representative, but somewhat disturbed, soil sample.

Water Level Measurements - Water level observations were made during the boring operations and are noted on the boring logs presented herewith. In relatively pervious soils, such as sandy soils, the indicated elevations are considered reliable groundwater levels. In relatively impervious soils, the accurate determination of the groundwater elevation may not be possible even after several days of observation. Seasonal variations, temperature and recent rainfall conditions may influence the levels of the groundwater table and volumes of water will depend on the permeability of the soils.

LABORATORY TESTING PROGRAM

In addition to the field investigation, a supplemental laboratory testing program was conducted to determine additional pertinent chemical characteristics of the subsurface materials.

All phases of the laboratory testing program were conducted in general accordance with applicable ASTM Specifications and the results of these tests are to be found on the accompanying boring logs and data sheets located in the Appendix.

SUBSURFACE CONDITIONS

General

The types of foundation materials encountered have been visually classified and are described in detail on the boring logs. The results of the field penetration tests, strength tests, water level observations and

other laboratory tests are presented on the boring logs in graphical and numerical form. The soil profile encountered was erratic. Representative samples of the soils were placed in sample jars and are now stored in the laboratory for further analysis if desired. Unless notified to the contrary, all samples will be disposed of after 3 months.

The stratification of the soils, as shown on the boring logs, represents the soil conditions in the actual boring locations, and other variations may occur between the borings. Lines of demarcation represent the approximate boundary between the soil types, but the transition may be gradual.

It is to be noted that, whereas the test borings are drilled and sampled by experienced drillers, it is sometimes difficult to record changes in stratification within narrow limits, especially at great depths. In the absence of foreign substances, it is also difficult to distinguish between discolored soils and clean soil fill.

Even though neither cobbles nor boulders were encountered by the soil boring operations, it is possible that they may be encountered during the foundation construction because of the nature of the geologic method of deposition of the soil deposits present at this site.

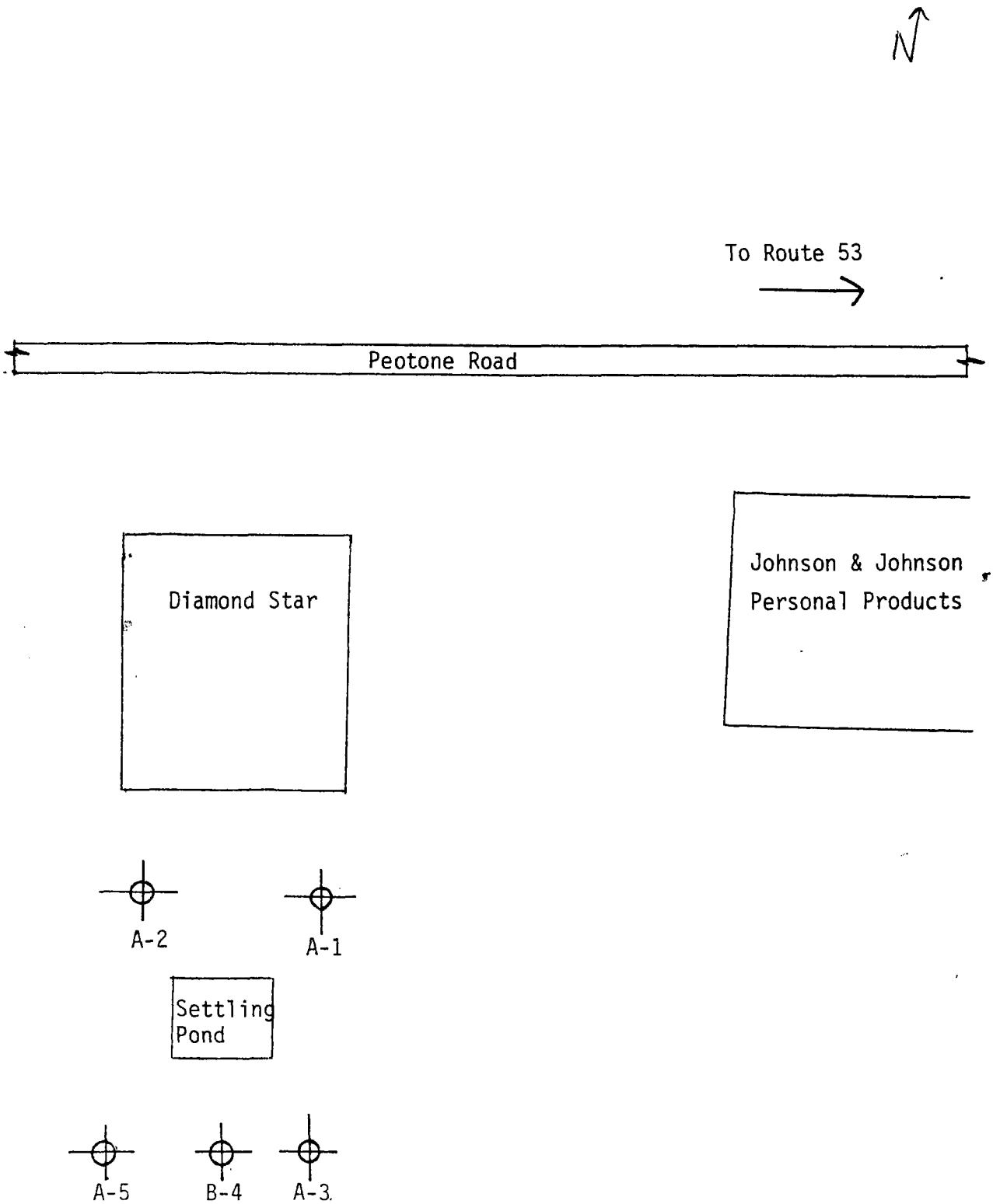
Groundwater Observations

The groundwater level measured in the borings ranged from three (3) feet to seven (7) feet below the ground surface.

It should be noted that groundwater levels on this site may vary due to seasonal conditions and recent rainfall.

APPENDIX

Professional Service Industries



PROJECT NAME	BORING LOCATION DIAGRAM	
Diamond Star Plant Wilmington, Illinois	PROJECT NO 043-75020	DATE June 23, 1987

14-300.7

Telephone (312) 544-3260

SUBURBAN LABORATORIES, Inc.

4140 LITT DRIVE HILLSIDE, ILLINOIS 60162 - 1183

EARL I. ROSENBERG
President

H.R. THOMAS, JR.
Director

Professional Service Industries, Inc.
4421 Harrison Street
Hillside, Illinois 60162

Attention: Mr. Tom Le Donne

Sample Received: 6/1/87

Source: S/L #7-5643 - Soil Composite of AP-1 (3'&4'), AP-2 (6') A-3 (6'&8'), B's (6'&7.5'), AP-5 (4'&6')

		Raw			Raw (ppm)	E. P. Toxicity (mg/l)
pH		8.3	(+)	Arsenic	3.02	-
Flash Point (CC)	(°F)	> 212°F		Barium	< 1.00	-
Phenols	(ppm)	< 0.15		Cadmium	0.40	-
Cyanide, Total	(ppm)	< 0.20		Chromium, Total	10.0	< 0.10
Cyanide, Reactive		-		Lead	4.66	-
Sulfide, Total	(ppm)	0.20		Mercury	0.02	-
Sulfide, Reactive		-	(+)	Selenium	0.012	-
PCB	(ppm)	< 0.1		Silver	< 0.10	-
Acidity (as $CaCO_3$)	(mg/l)	0.0				
Alkalinity (as $Ca\ CO_3$)	(%)	0.680				
Total Solids	(%)	80.77				
Total Organic Carbon	(ppm)	1920				
Paint Filter		N*				
Penetrometer	(tons/ft^2)	< 0.5				

*Free Liquid Present

ANALYSIS CERTIFIED BY: _____ Director (HRT/ck)

cc: Mr. John LaBerg (Joliet)

Professional Service Industries, Inc.

RECORD OF SUBSURFACE EXPLORATION

Boring A-1

Project Name: Diamond Star Plant — Date of Boring: June 1, 1987

Site: Wilmington, Illinois — Project No.: 043-75020

DESCRIPTION	DEPTH	SAMPLE	N	Q_u	Q_p	M_c	REMARKS
SURFACE							
TOPSOIL with gravel, moist		1AU			2.25		
Brown silty CLAY moist, very stiff		2AU			2.0		
		3AU			2.0		
Light brown sandy SILT with trace gravel, moist					1.5		
	5						
		4AU					
Gray silty CLAY, moist	10						
	15						
End of probe = 15.0'							
Groundwater depth after drilling was 3.0'							

Professional Service Industries, Inc.

RECORD OF SUBSURFACE EXPLORATION

Boring A-2

Project Name: Diamond Star Plant — Date of Boring: June 1, 1987

Site: Wilmington, Illinois — Project No.: 043-75020

DESCRIPTION	DEPTH	SAMPLE	N	Q_u	Q_p	M_c	REMARKS
SURFACE							
TOPSOIL, moist		1AU			3.25		
		2AU			2.5		
Dark brown silty CLAY moist, very stiff					1.0		
					4.0		
		3AU			.75		
Light brown clayey SILT with gravel moist, stiff	5				1.5		
		4AU					
Grayish brown clayey SILT with gravel, wet							
	10	5AU					
Pitrun GRAVEL with brown silty clay, moist							
Auger refusal at 13.0'							
End of probe = 13.0'							
Groundwater depth after drilling = 5.0'	15						

Professional Service Industries, Inc.

RECORD OF SUBSURFACE EXPLORATION

Boring A-3

Project Name: Diamond Star Plant Date of Boring: June 1, 1987

Site: Wilmington, Illinois Project No.: 043-75020

DESCRIPTION	DEPTH	SAMPLE	N	Q_u	Q_p	M_c	REMARKS
SURFACE							
TOPSOIL, moist		1AU					
Fine brown SAND with silt, moist		2AU					
	5	3AU					
Fine brown SAND mixed with gray silt and some cobbles, wet							
	10						
Auger refusal at 11.5'							
End of probe = 11.5'							
Groundwater depth after drilling = 7.5'							
	15						

Professional Service Industries, Inc.

RECORD OF SUBSURFACE EXPLORATION

Boring B-4

Project Name: Diamond Star Plant — Date of Boring: June 1, 1987

Site: Wilmington, Illinois — Project No.: 043-75020

DESCRIPTION	DEPTH	SAMPLE	N	Q_u	Q_p	M_c	REMARKS
SURFACE							
Dark brown silty SAND moist, very loose		1SS	1 1 1				
Fine brown SAND moist, very loose		2SS	1 1 1				
		3SS	5 6 6				
Light gray silty SAND moist, dense	5	4SS	5 7 10				
		5SS	2 3 4				
Light brown GRAVEL wet, very dense		6SS	5 9 17				
Gray silty CLAY with gravel moist, very dense	10	7SS	15 17 50/2"				
Auger refusal at 12.0'		8SS	38 50/2"				
End of boring = 12.0'							
Groundwater depth during drilling = 7.0'							
	15						

Professional Service Industries, Inc.

RECORD OF SUBSURFACE EXPLORATION

Boring A-5

Project Name: Diamond Star Plant — Date of Boring: June 1, 1987

Site: Wilmington, Illinois — Project No.: 043-75020

DESCRIPTION	DEPTH	SAMPLE	N	Q_u	Q_p	M_c	REMARKS
SURFACE							
Dark brown SAND, trace organics		1AU					
Light btown silty SAND, moist		2AU					
		3AU					
Light brown silty SAND with silty clay, moist	5						
		4AU					
Gray clayey SAND, moist	10						
		5AU					
Gray sandy CLAY, trace gravel, moist Auger refusal at 13.0'							
End of probe = 13.0' Groundwater depth after drilling = 13.0'	15						

GENERAL NOTES

SAMPLE IDENTIFICATION

The Unified Soil Classification System is used to identify the soil unless otherwise noted.

SOIL PROPERTY SYMBOLS

N: Standard "N" penetration: Blows per foot of a 140 pound hammer falling 30 inches on a 2 inch O.D. split-spoon.

Qu: Unconfined compressive strength, TSF

Qp: Penetrometer value, unconfined compressive strength, TSF

Mc: Water content, %

LL: Liquid limit, %

PI: Plasticity Index, %

δ d: Natural dry density, PCF

▼: Apparent groundwater level at time noted after completion.

DRILLING AND SAMPLING SYMBOLS

SS: Split-Spoon - 1 3/8" I.D., 2" O.D., except where noted.
ST: Shelby Tube - 3" O.D., except where noted.
AU: Auger Sample.
DB: Diamond Bit.
CB: Carbide Bit.
WS: Washed Sample.

RELATIVE DENSITY AND CONSISTENCY CLASSIFICATION

TERM (NON-COHESIVE SOILS)	STANDARD PENETRATION RESISTANCE
Very Loose	0 - 2
Loose	2 - 4
Slightly Compact	4 - 8
Medium Dense	8 - 16
Dense	16 - 26
Very Dense	Over 26

TERM (COHESIVE SOILS)	Qu - (TSF)
Very Soft	0 - 0.25
Soft	0.25 - 0.50
Firm (Medium)	0.50 - 1.00
Stiff	1.00 - 2.00
Very Stiff	2.00 - 4.00
Hard	4.00+

PARTICLE SIZE

Boulders	8 in. +	Coarse Sand	5mm-0.6mm	Silt	0.074mm-0.005mm
Cobbles	8 in.-3 in.	Medium Sand	0.6mm-0.2mm	Clay	-0.005mm
Gravel	3 in.-5mm	Fine Sand	0.2mm-0.074mm		